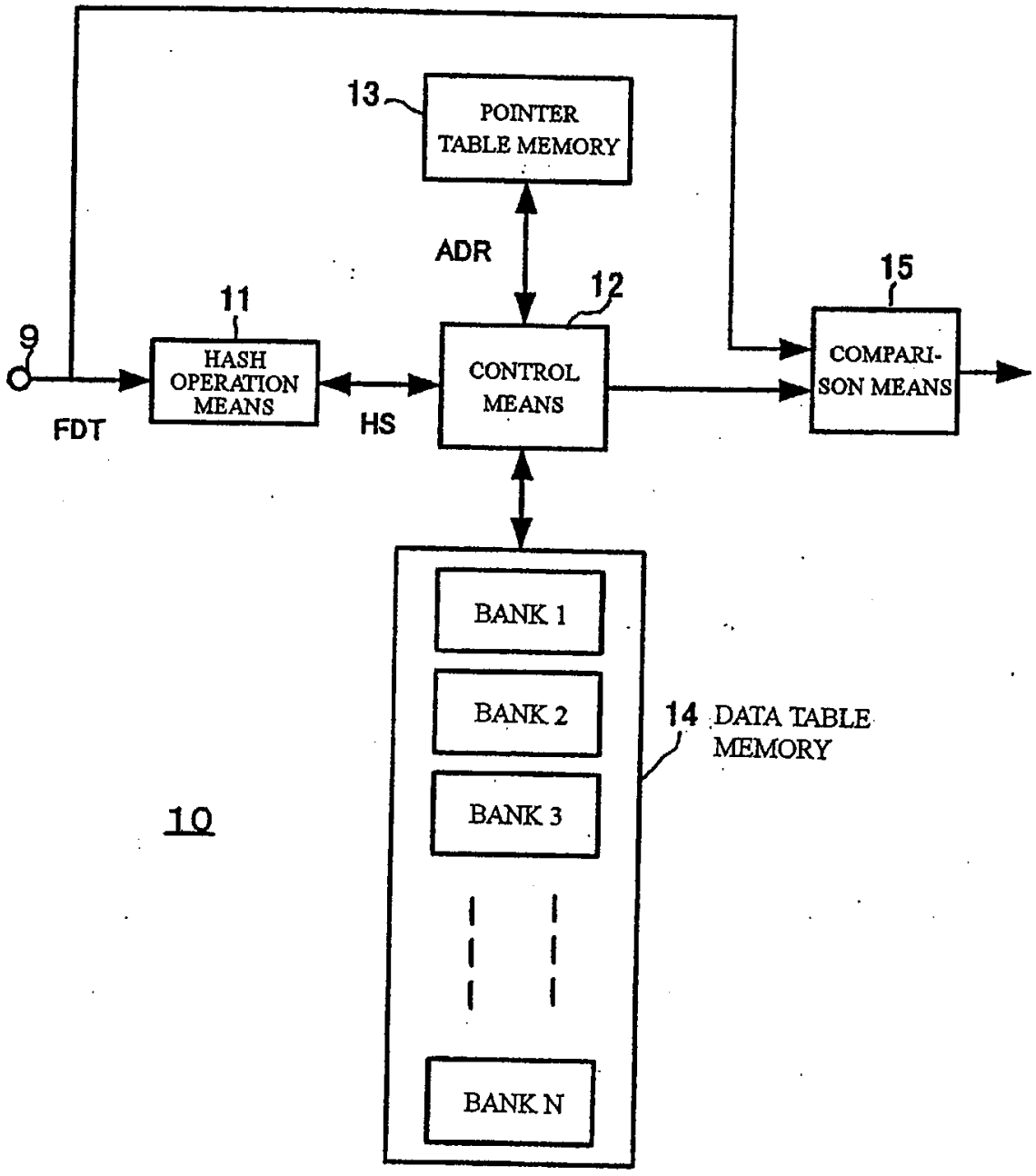
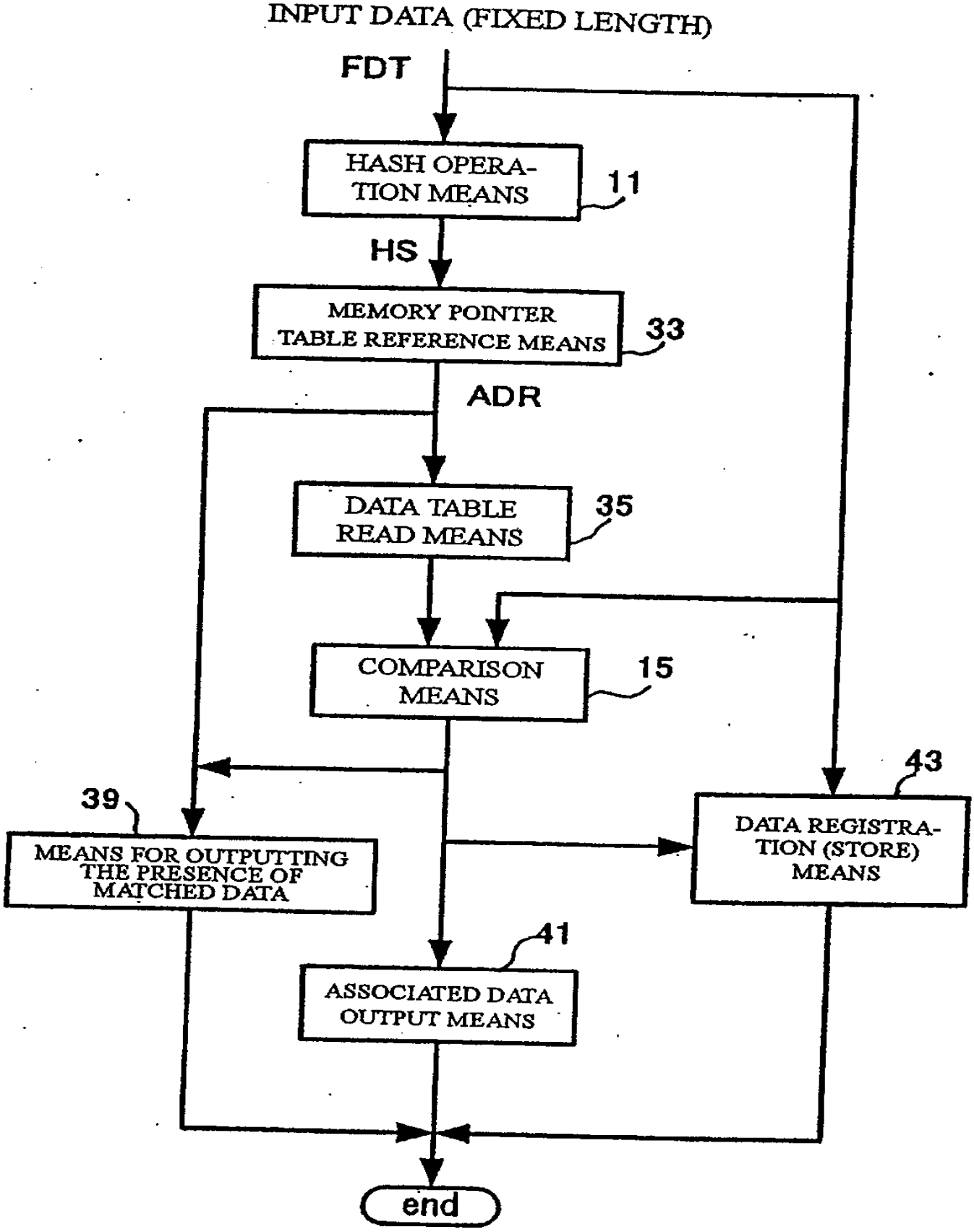
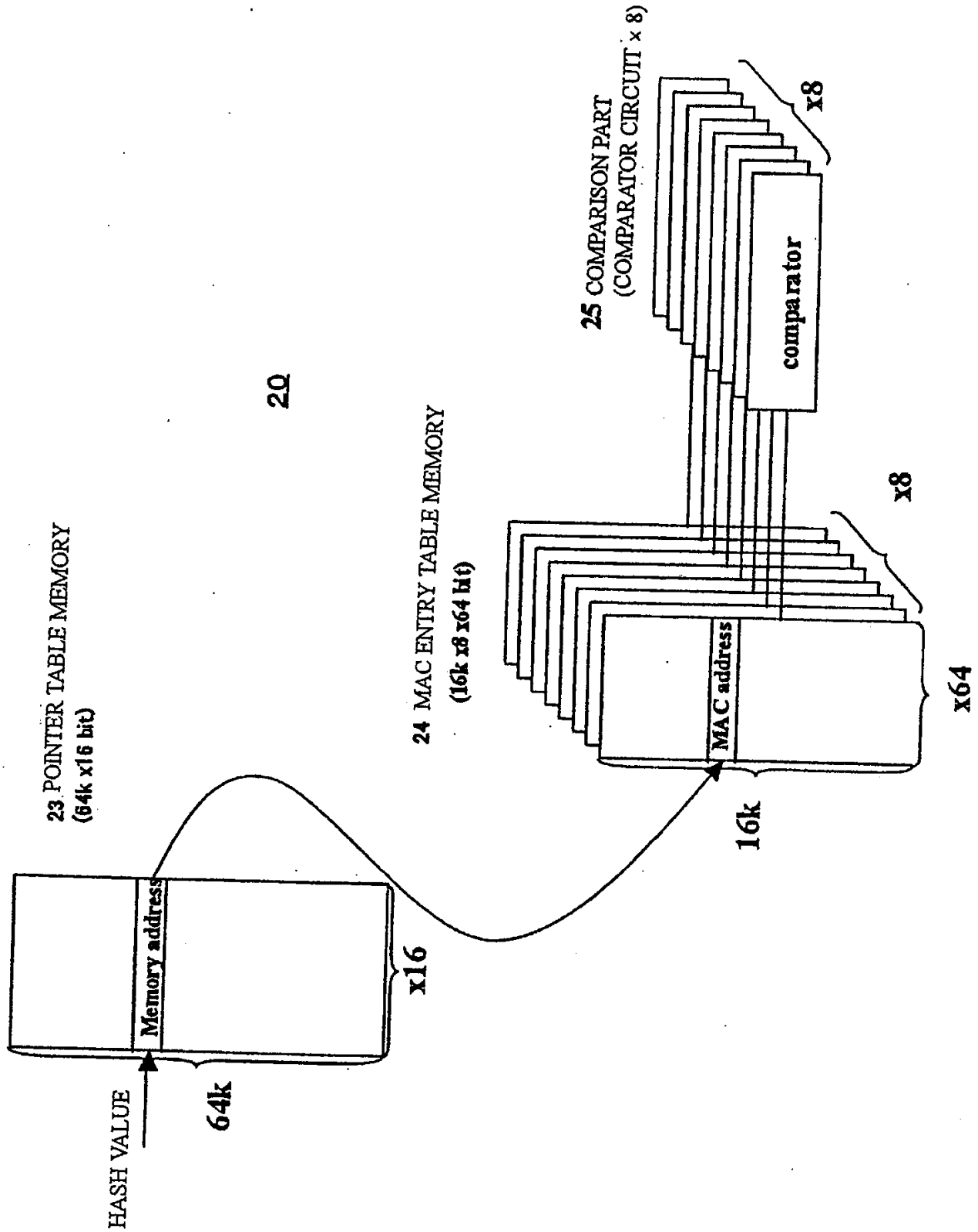
[Figure 1]

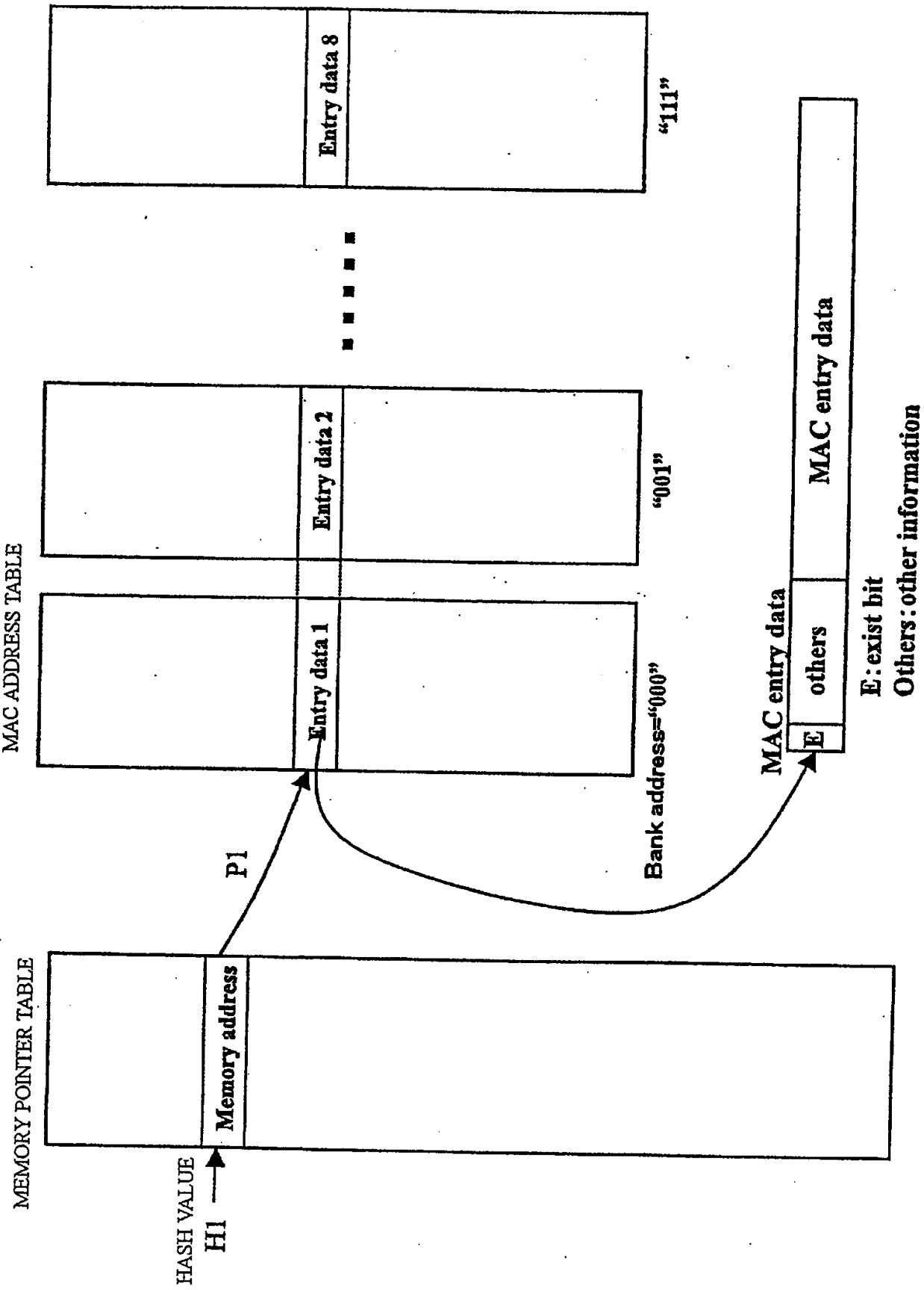

13
POINTER TABLE MEMORY
ADR
12
15
11
9
HASH OPERATION MEANS
CONTROL MEANS
COMPARI-SON MEANS
FDT
HS
BANK 1
BANK 2
BANK 3
BANK N
14 DATA TABLE MEMORY
10


INPUT DATA (FIXED LENGTH)
FDT
HASH OPERATION MEANS
11
HS
MEMORY POINTER TABLE REFERENCE MEANS
33
ADR
DATA TABLE READ MEANS
35
COMPARISON MEANS
15
39
MEANS FOR OUTPUTTING THE PRESENCE OF MATCHED DATA
43
DATA REGISTRATION (STORE) MEANS
41
ASSOCIATED DATA OUTPUT MEANS
end

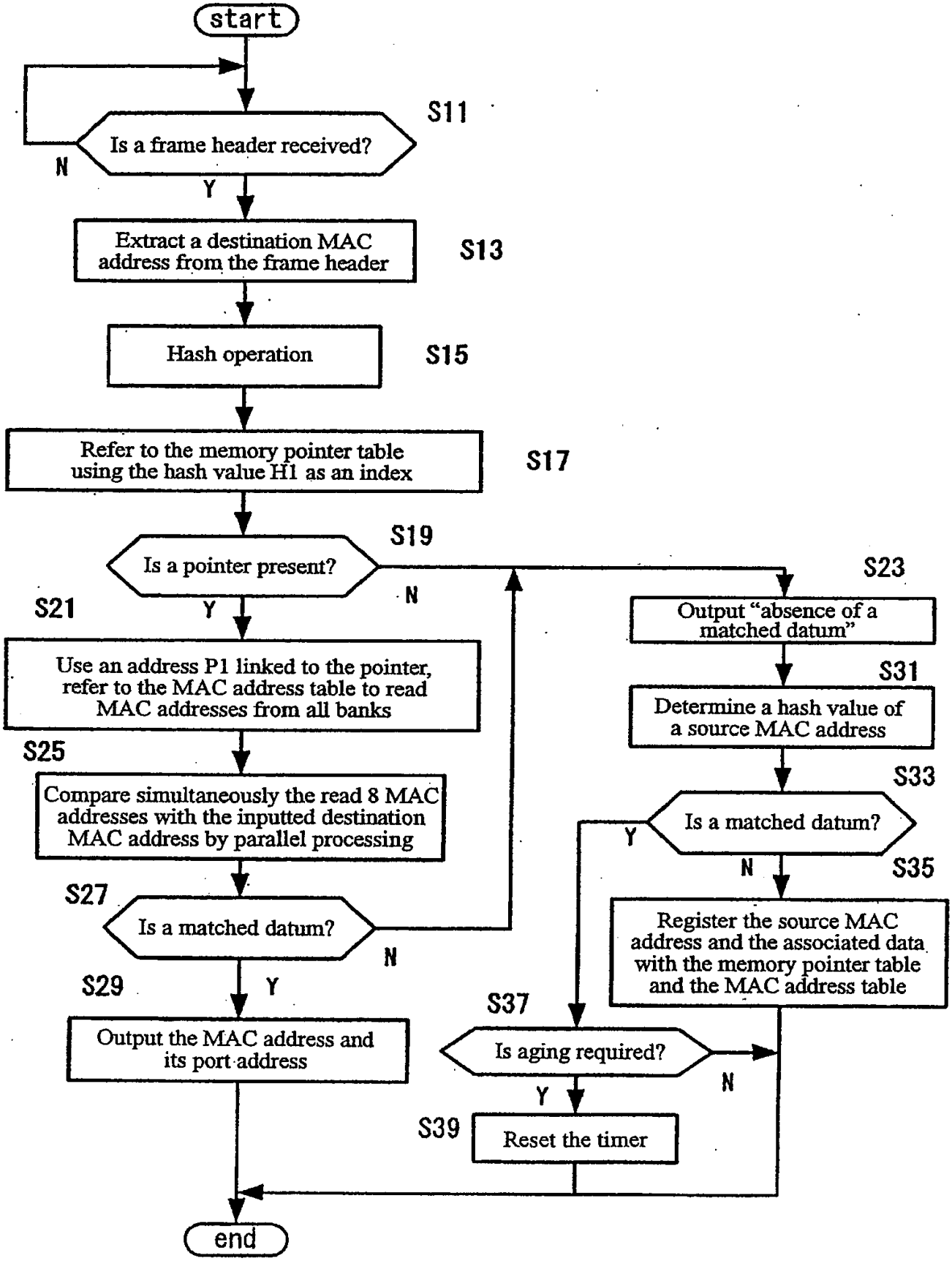
[Figure 3]


20
23 POINTER TABLE MEMORY
(64k x16 bit)
Memory address
64k
x16
HASH VALUE
24 MAC ENTRY TABLE MEMORY
(16k x8 x64 bit)
MAC address
16k
x8
x64
25 COMPARISON PART
(COMPARATOR CIRCUIT x 8)
comparator
x8

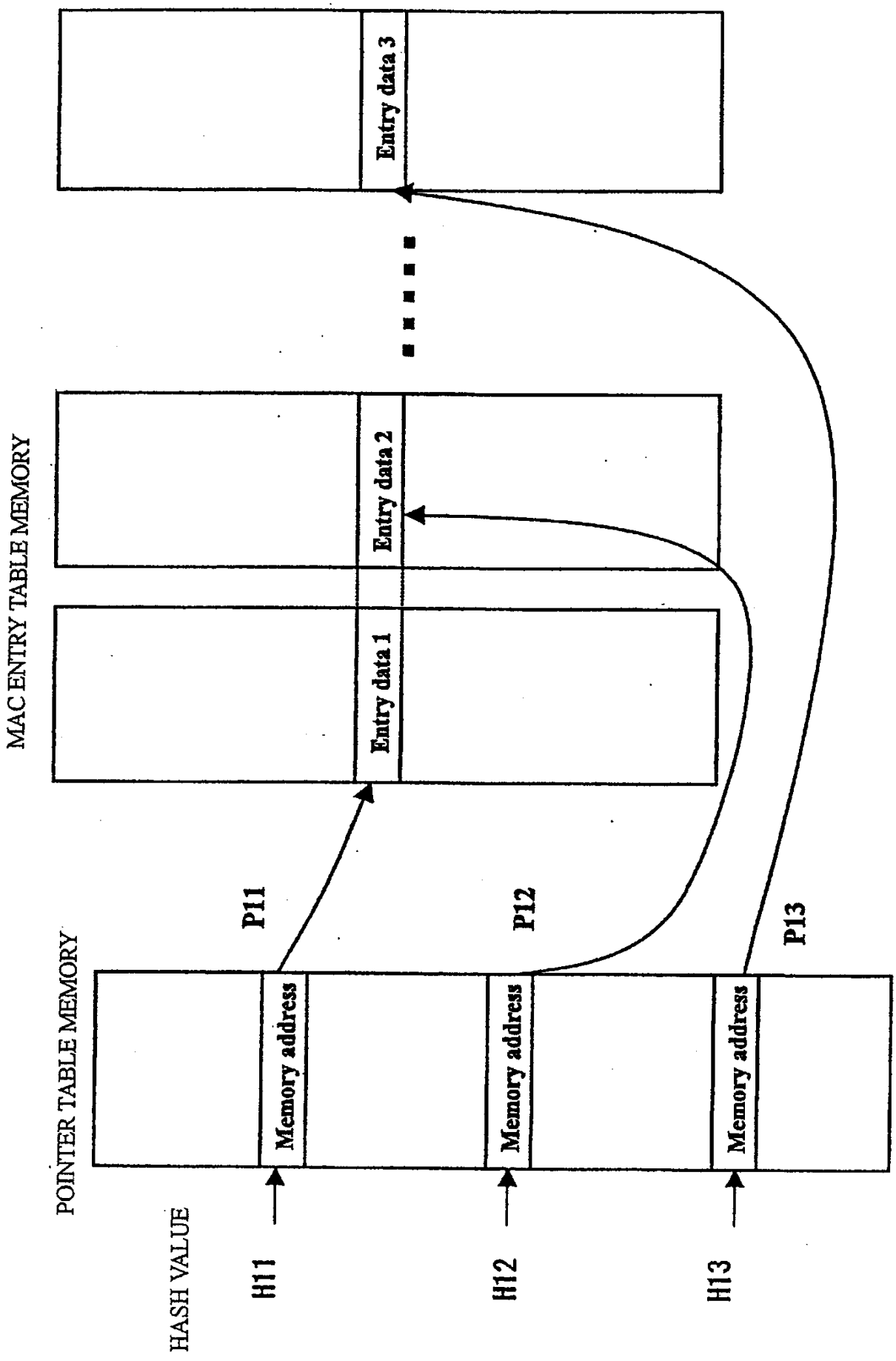
[Figure 4]


MEMORY POINTER TABLE
Memory address
HASH VALUE
H1
P1
MAC ADDRESS TABLE
Entry data 1
Entry data 2
Entry data 8
"000"
"001"
"111"
Bank address="000"
MAC entry data
E
others
MAC entry data
E: exist bit
Others: other information

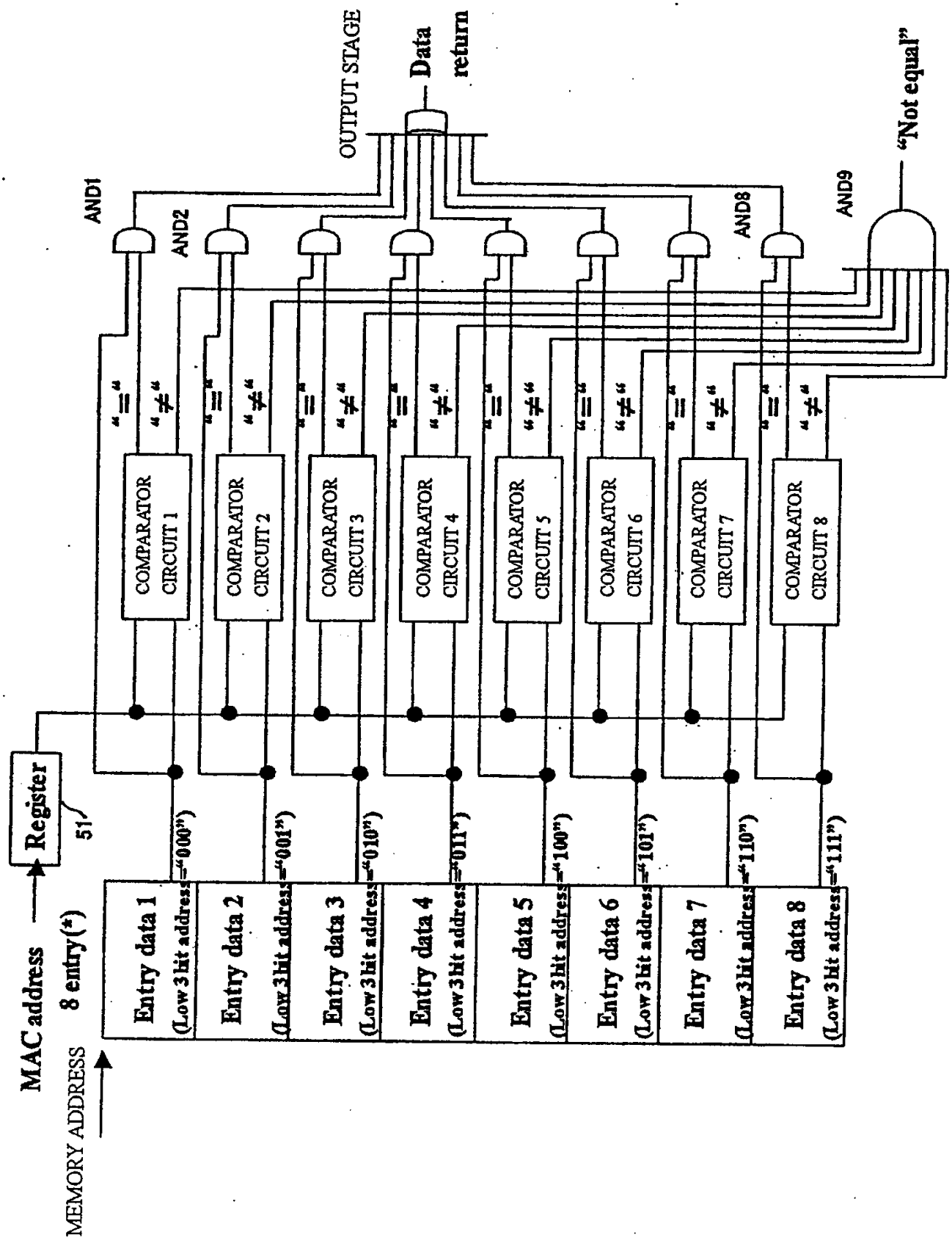
[Figure 5]


start
S11
Is a frame header received?
N
Y
Extract a destination MAC address from the frame header
S13
Hash operation
S15
Refer to the memory pointer table using the hash value H1 as an index
S17
S19
Is a pointer present?
N
Y
S21
Use an address P1 linked to the pointer, refer to the MAC address table to read MAC addresses from all banks
S25
Compare simultaneously the read 8 MAC addresses with the inputted destination MAC address by parallel processing
S27
Is a matched datum?
N
Y
S29
Output the MAC address and its port address
S23
Output "absence of a matched datum"
S31
Determine a hash value of a source MAC address
S33
Is a matched datum?
Y
N
S35
Register the source MAC address and the associated data with the memory pointer table and the MAC address table
S37
Is aging required?
N
Y
S39
Reset the timer
end

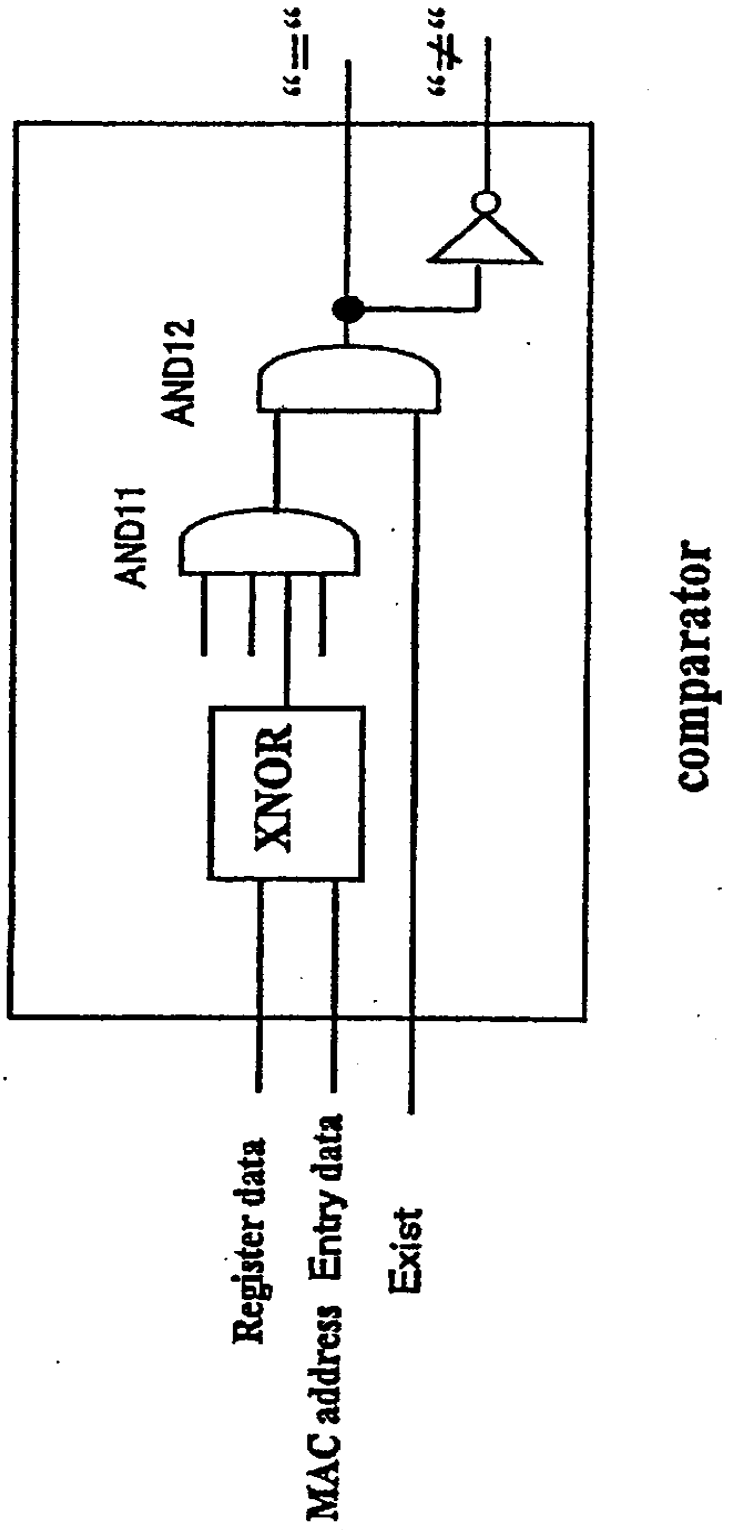
[Figure 6]


HASH VALUE
H11
H12
H13
POINTER TABLE MEMORY
Memory address
Memory address
Memory address
P11
P12
P13
MAC ENTRY TABLE MEMORY
Entry data 1
Entry data 2
Entry data 3

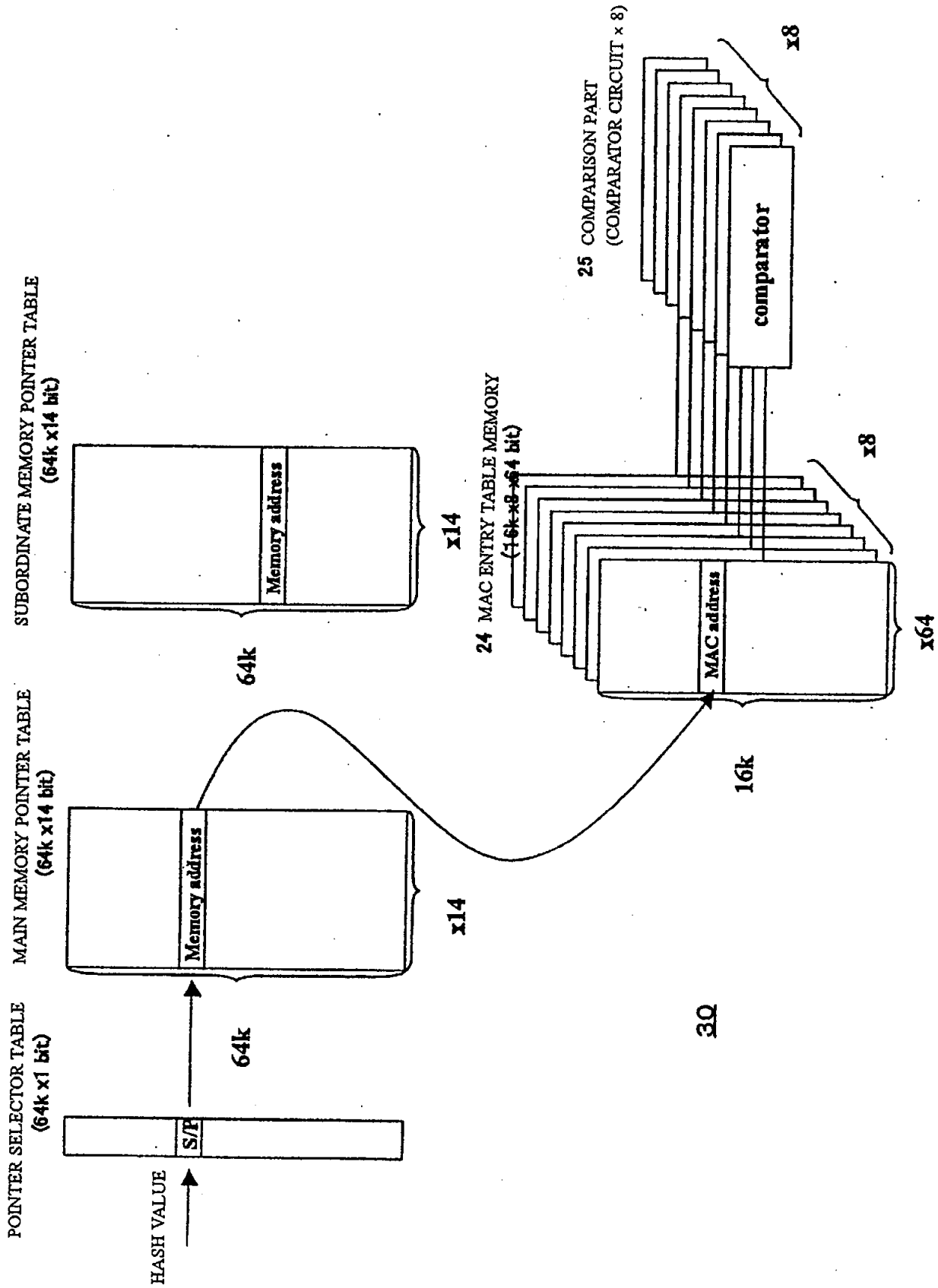
[Figure 7]


MAC address
MEMORY ADDRESS
8 entry(*)
Register
51
Entry data 1 (Low 3 bit address="000")
Entry data 2 (Low 3 bit address="001")
Entry data 3 (Low 3 bit address="010")
Entry data 4 (Low 3 bit address="011")
Entry data 5 (Low 3 bit address="100")
Entry data 6 (Low 3 bit address="101")
Entry data 7 (Low 3 bit address="110")
Entry data 8 (Low 3 bit address="111")
COMPARATOR CIRCUIT 1
COMPARATOR CIRCUIT 2
COMPARATOR CIRCUIT 3
COMPARATOR CIRCUIT 4
COMPARATOR CIRCUIT 5
COMPARATOR CIRCUIT 6
COMPARATOR CIRCUIT 7
COMPARATOR CIRCUIT 8
"="
"≠"
AND1
AND2
AND8
AND9
OUTPUT STAGE
Data return
"Not equal"

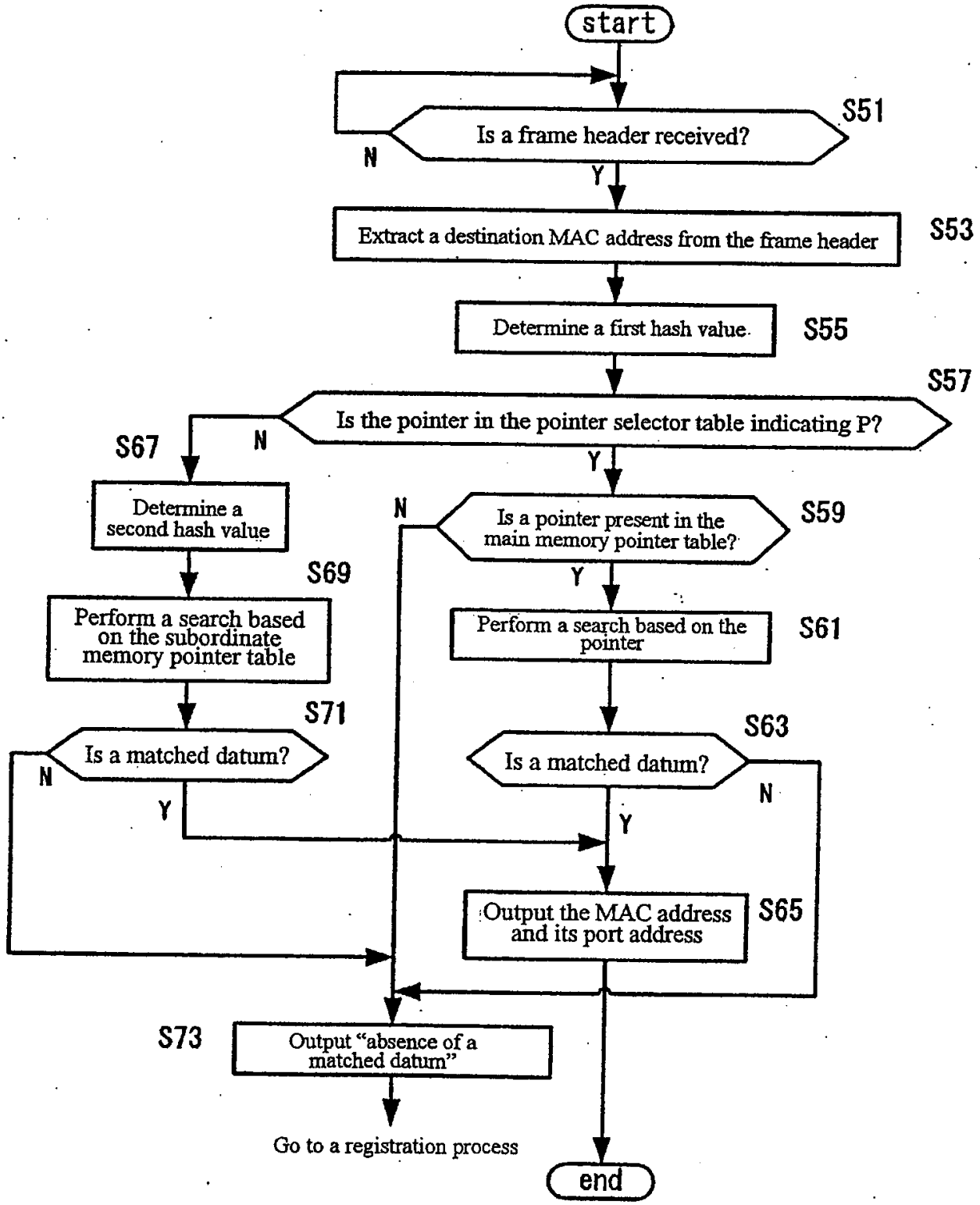
[Figure 8]


"="
"≠"
AND12
AND11
XNOR
comparator
Register data
MAC address Entry data
Exist

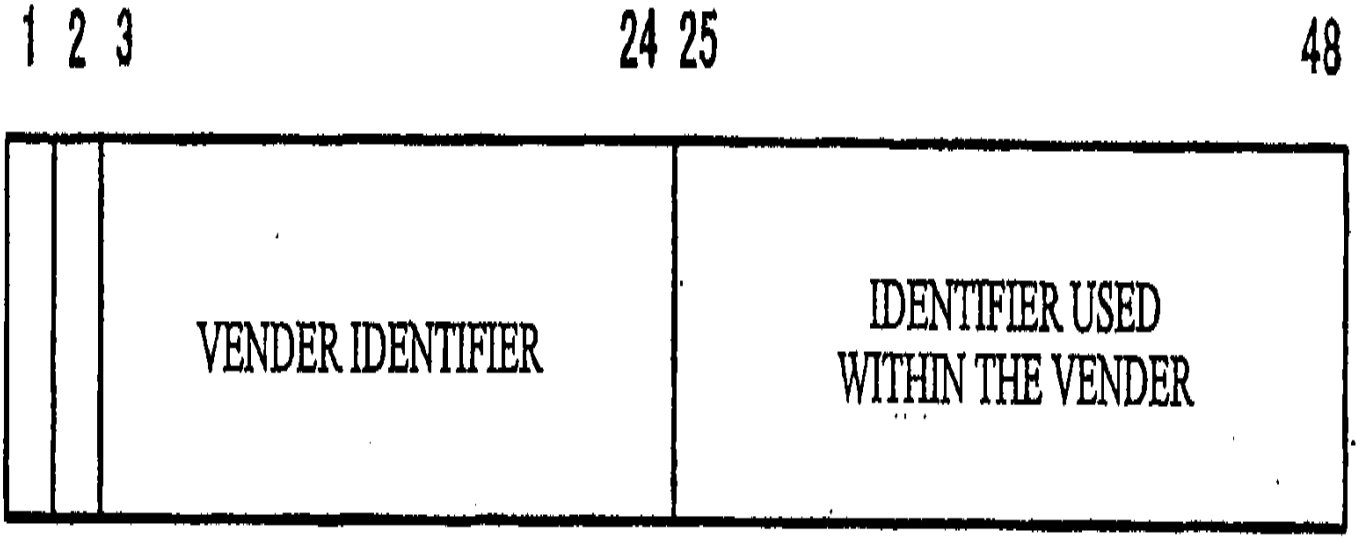
[Figure 9]


HASH VALUE
POINTER SELECTOR TABLE
(64k x1 bit)
S/P
64k
MAIN MEMORY POINTER TABLE
(64k x14 bit)
Memory address
x14
SUBORDINATE MEMORY POINTER TABLE
(64k x14 bit)
Memory address
64k
x14
24 MAC ENTRY TABLE MEMORY
(16k x8 x64 bit)
MAC address
16k
x64
x8
25 COMPARISON PART
(COMPARATOR CIRCUIT x 8)
comparator
x8
30

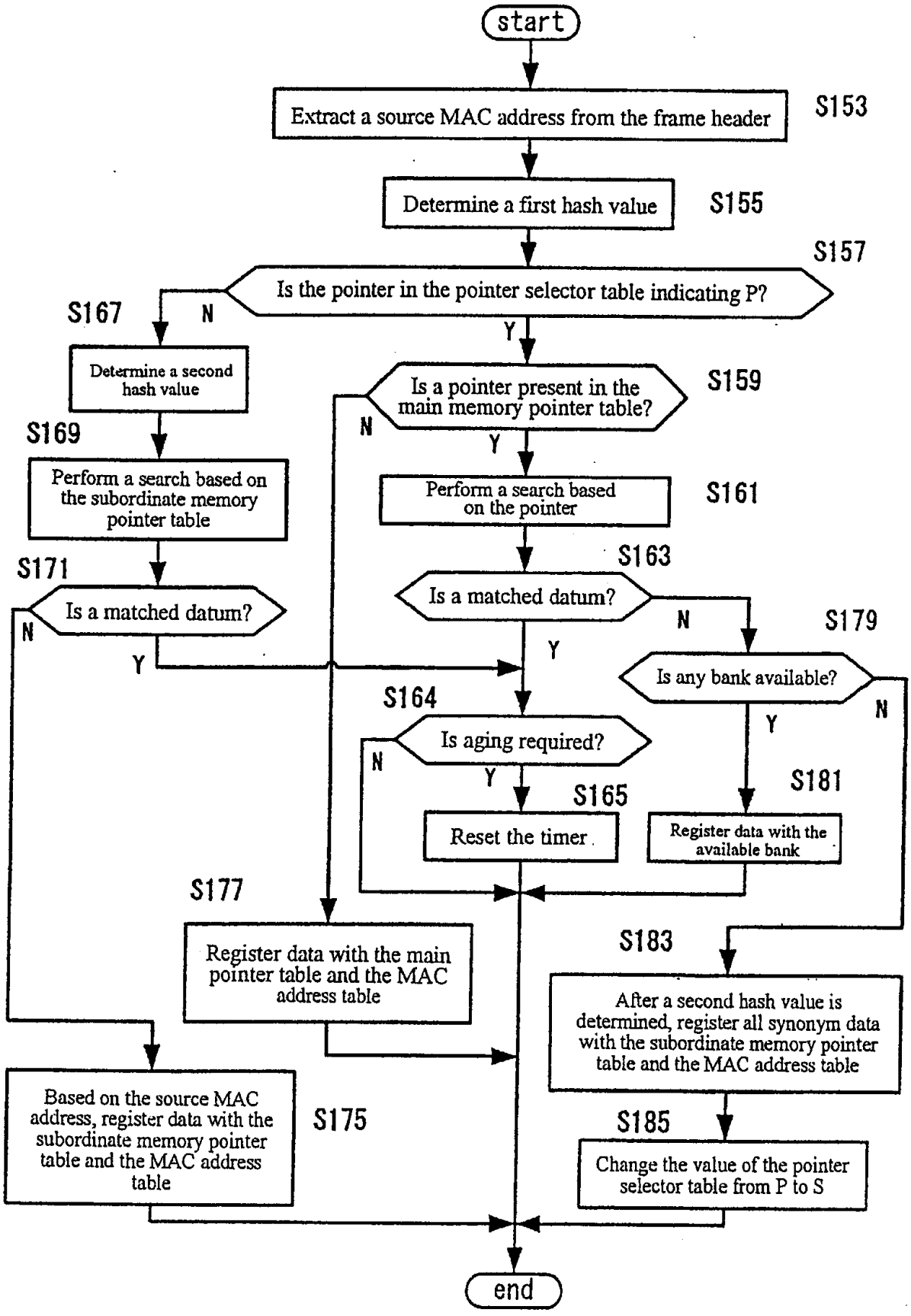
[Figure 10]


start
S51
Is a frame header received?
N
Y
Extract a destination MAC address from the frame header
S53
Determine a first hash value
S55
S57
Is the pointer in the pointer selector table indicating P?
S67
N
Y
Determine a second hash value
N
Is a pointer present in the main memory pointer table?
S59
S69
Y
Perform a search based on the subordinate memory pointer table
Perform a search based on the pointer
S61
S71
S63
Is a matched datum?
Is a matched datum?
N
N
Y
Y
Output the MAC address and its port address
S65
S73
Output "absence of a matched datum"
Go to a registration process
end

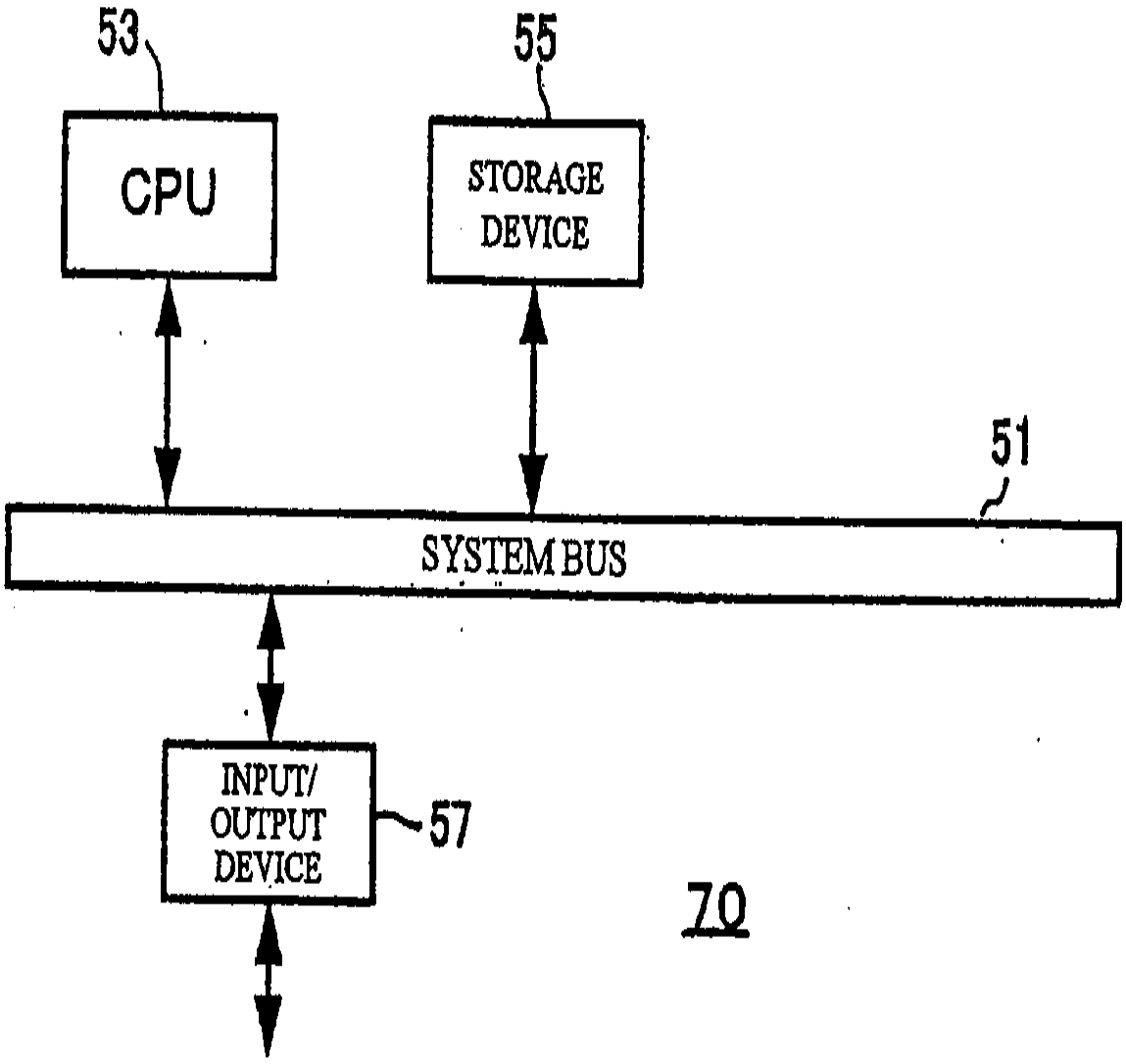
[Figure 11]


1 2 3
24 25
48
VENDER IDENTIFIER
IDENTIFIER USED
WITHIN THE VENDER

[Figure 12]


start
Extract a source MAC address from the frame header
S153
Determine a first hash value
S155
S157
Is the pointer in the pointer selector table indicating P?
N
Y
S167
Determine a second hash value
S169
Perform a search based on the subordinate memory pointer table
S171
Is a matched datum?
N
Y
Is a pointer present in the main memory pointer table?
S159
N
Y
Perform a search based on the pointer
S161
S163
Is a matched datum?
N
Y
S179
Is any bank available?
N
Y
S164
Is aging required?
N
Y
S165
Reset the timer
S181
Register data with the available bank
S177
Register data with the main pointer table and the MAC address table
S183
After a second hash value is determined, register all synonym data with the subordinate memory pointer table and the MAC address table
Based on the source MAC address, register data with the subordinate memory pointer table and the MAC address table
S175
S185
Change the value of the pointer selector table from P to S
end

[Figure 13]


53
55
CPU
STORAGE DEVICE
51
SYSTEM BUS
INPUT/ OUTPUT DEVICE
57
70